ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems	)	PR Docket No. 93-61 RM-8013

To: The Commission

FURTHER REPLY COMMENTS OF MOBILEVISION, L.P.

John J. McDonnell
Marnie K. Sarver
Matthew J. Harthun

REED SMITH SHAW & McCLAY
1200 18th Street, N.W.
Washington, D.C. 20036
(202) 457-6100

March 29, 1994

TABLE OF CONTENTS

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems	)	PR Docket No. 93-61 RM-8013

To: The Commission

FURTHER REPLY COMMENTS OF MOBILEVISION, L.P.

MobileVision, L.P. ("MobileVision"), by its attorneys, hereby submits Further Reply Comments in response to the Further Comments filed by various parties in the above-captioned proceeding pursuant to the Commission's Public Notice of February 9, 1994.

INTRODUCTION

The diversity of the positions taken in the Further Comments and the divergent interests of the commenters have done little to clear an already confused and contradictory record. MobileVision's statements of the requirements necessary in order for licensed wideband LMS systems to provide technically and economically viable systems for IVHS and other uses have remained consistent throughout this rulemaking proceeding. Moreover, while MobileVision's comments have been accompanied by technical analysis and have been prepared with the benefit of extensive market survey research, the other divergent comments are not so well grounded. The modest variations proposed by

MobileVision in its most recent filing remain true to those stated requirements and consistent with the hard scientific analysis it has presented, while at the same time addressing the concerns of Part 15 users and narrowband LMS systems by providing for a safe haven for Part 15 users and 10 MHz of contiguous bandwidth to meet the stated needs of AMTECH and other narrowband LMS providers.

The Further Comments of the wideband LMS providers show that there is:

- no support for direct overlay as proposed by Teletrac (Pinpoint's apparent agreement rests on the assumption that Pinpoint will use the 912-928 MHz sub-band on a co-primary basis with local area systems),
- no support for Pinpoint's proposal for time-sharing, and
- no support for Southwestern Bell's urging that the licensed bandwidth be reduced to 4 MHz.[1]

Putting aside these system differences in technical requirements for bandwidth and interference protection (discussed in detail in MobileVision's Further Comments), the most significant difference between MobileVision and the other prospective wideband LMS providers arises over the need for the capability and capacity to provide broad ancillary voice and data services adjunct to the primary location function requirements of these systems. Those capabilities are already provided for in the Interim Rules and MobileVision is currently licensed to provide them to subscribers. The other wideband LMS providers

---

[1] The time-sharing proposal of Pinpoint and the direct overlay proposal of Teletrac are without scientific support and totally and unreservedly unworkable, as shown by the analyses of MobileVision, Southwestern Bell and Virginia Tech; Southwestern Bell's proposed fragmentation of the spectrum turns on their status as a cellular affiliate and is inefficient for location services and does not offer the capacity for non-cellular providers to serve market and IVHS needs. As between the multiple LMS use proposals of Teletrac and Pinpoint, on the one hand, and the inefficient proposal of Southwestern Bell on the other, the latter is the lesser of two evils. Neither need be adopted, however, since MobileVision's proposals adequately address any legitimate needs of the competing interests who have filed comments in this proceeding and represent the most effective coexistence of the various users in the spectrum, whether wideband, narrowband or Part 15.

who now urge constraints and limitations on these service offerings do so either because they are affiliates of cellular providers (Teletrac and Southwestern Bell), who can offer LMS services as adjunct to their cellular systems, or because they intend to offer data services but not voice in any significant manner (Pinpoint).[2] But as indicated in MobileVision's prior submissions in this proceeding, IVHS requirements[3] and market demands, as demonstrated by extensive prospective customer surveys and studies, will not be met without ancillary voice and data availability.

The positions taken by the Part 15 commenters would divert the Commission's focus from the purpose of this rulemaking -- to assure the deployment of LMS systems -- to protection of their secondary place in this spectrum, perceived by them to threaten LMS providers. While they are not entitled to any such protection under existing rules and, therefore, understood their risk in development under that secondary status, MobileVision, in recognition of their existing proliferation throughout the spectrum, has proposed a number of changes to the recommendations set forth in the NPRM that address their concerns.

---

2 Because Pinpoint proposes a time sharing scheme that negates voice capability as its only method of entering the LMS market, given its late start both technically and in applying for licenses, its opposition to voice is not merely premised on its decision to make more limited service offerings, but also because it serves its tactical attempts to achieve through rule changes the entry that it was not able to achieve through earlier investment and technical development in accordance with the Interim Rules. Moreover, Pinpoint's objecting to ancillary voice services, while itself proposing adjunct data service, is, at best, a diversion and, at worst, disingenuous in today's technological environment where voice and data can flow indistinguishably as digital bits in a transmission stream.

3 Annex 1 to MobileVision's Further Comments addresses those IVHS requirements for LMS systems in detail.

It is important to restate those recommendations and the other changes suggested by MobileVision in its Further Comments that were designed to address additional concerns that have arisen during the comment period:

1. Reallocate the spectrum for wideband spread spectrum LMS providers to 902-910 MHz and 920-928 MHz and provide protection on such spectrum to the first licensee to build on each such band as set forth in these suggested changes. This reallocation should be expressly conditioned on the adoption of changes to the forward link allocations and the adherence to strict out of band emission limits in adjacent frequency bands as set forth below. Otherwise, the operation of LMS systems in the reallocated bands will not be possible.

2. Move the forward link for each wideband provider to the same provider's licensed 8 MHz bandwidth, subject to the grandfathering provisions set forth in these suggested changes, since with the shift of band allocation the current forward links will create intolerable interference.

3. Require strict adherence to out of band emission limits not only within 902-928 MHz band but in connection with users of the frequencies above and below that band.[4]

4. While allowing Part 15 users on a secondary basis in the spectrum reserved for wideband LMS providers (902-910 MHz and 920-928 MHz), provide for narrowband LMS use and Part 15 use in the middle spectrum (910-920 MHz), as well as for any developmental licenses, thus providing for both a contiguous 10 MHz band for the narrowband users, as their comments suggest they need, and a safe haven for those Part 15 users that anticipate interference to or from wideband LMS providers. This allocation is consistent technically with narrowband provider comments regarding their tolerance to interference from Part 15 users.

5. Establish tolerance standards for interference from Part 15 users in the wideband and narrowband allocated spectrum. In those isolated instances where existing Part 15 devices in use would interfere with wideband providers, even after coordination, in the 902-910 MHz and 920-928 MHz bands, require, as necessary, migration to the middle spectrum (910-920 MHz) or other spectrum outside the LMS band. Because such instances of required migration are anticipated to be minimal, MobileVision submits that wideband providers should be required to defray or absorb reasonable costs of migration to such

---

4 Proposed specifications for such out of band emissions are submitted in Annex 3 to these Reply Comments.

frequencies where that cost is a hardship to existing Part 15 users existing on the Effective Date of the rules.

6. Permit wideband spread spectrum systems that claim and can demonstrate the ability to share with narrowband and Part 15 users the use of the middle band (910-920 MHz) on a secondary basis.[5]

7. In those markets where system infrastructure has already been deployed or systems are operating on the current bands or with forward links in the other band allocated for wideband systems, the Interim Rules for allocation should be grandfathered until migration to the new sub-bands and forward links can be coordinated by the currently deployed or operating systems but in no event later than two years.

With regard to the tolerance standards for Part 15 users in the bandwidth allocated for wideband LMS use (# 5 above), Teletrac has proposed a definition of harmful interference that considers the interference from one source compared to the average interference and noise floor. It suggests that the single source interference should exceed the average interference by 10 dB for more than 20% of the time before it is considered harmful. The problem with the term "average interference level" is that if, for example, there are two interferers, one could argue that they form an average level, and hence neither exceeds it. Moreover, it an interferer is blocking 20% of the signals, that is still a very significant desensitization. MobileVision would suggest a simpler definition, that would provide for measurement without ambiguity, as follows:

> Interference from a secondary device, e.g. Part 15, shall be considered harmful if the total signal power received from that device, across the LMS allocated sub-band, exceeds -92 dBm at the input to the LMS receiver.

The various LMS systems could be affected differently by the amount of time that the interfering signal is present, and therefore it is difficult to define a time limit. If the

---

5 Since both Pinpoint and AMTECH claim that Pinpoint could share its spectrum with Part 15 and narrowband, if Pinpoint were to move to this 10 MHz band, it would increase potential competition while protecting the other wideband providers who have indicated that they could not time-share with Pinpoint as it proposes.

interference level is higher than -92 dBm, but is short enough not to cause significant problems to a particular LMS system, then presumably, that LMS system will not complain. While LMS systems will have the additional system cost of closer average distances between towers, this compromise will permit a reasonable interference environment for both Part 15 and LMS.

In order to ensure the avoidance of interference between wideband LMS systems, when two licensees exist in the same wideband allocation, MobileVision proposes the following rules:

- Thirty days prior to commencement of system construction in any area, a wideband licensee that wishes protection from interference must file a certification indicating that its system is not a test/beta system and is currently capable of deployment on a commercially available basis to avoid frequency speculation schemes.

- Where two or more current licensees (i.e., entities holding licenses as of the date new rules are adopted) have provided certifications in a particular geographic area, the first wideband LMS system to construct a system in its authorized 8 MHz band in that area, and offering service to the market, will be afforded protection from interference caused by other licensees or future LMS co-channel users that results in degradation of service at fixed sites or mobile units.

- Any subsequent LMS service providers proposing to provide service in the same frequency band and in the same service area must operate on a non-interfering basis with the first system entitled to interference protection.

In addition, as MobileVision indicated in its Further Comments, the NPRM separation of wideband and narrowband systems reflected in the Interim Rules should be maintained, but existing narrowband sites should be grandfathered after coordination with wideband providers.

To avoid the current ambiguity in defining permissible communications, which ambiguity is apparent from MobileVision's ex parte communications with the Commission wherein no single definition of ancillary services has been offered, MobileVision also indicated that the definition of LMS should be as follows:

> The use of non-voice signalling methods from and to radio units to make known the location of such units. LMS systems may also transmit and receive ancillary voice and non-voice communications to and from the units being located.

This definition will allow the marketplace to define its needs while making it clear that the primary service is location. To do otherwise would require a Commission ruling for each variant or new ancillary service, thus creating delay and uncertainty for the provider and an unmanageable policing and ruling function for the Commission.

MobileVision's Further Comments also proposed that any concerns about adequate competition can be addressed through the following provisions for licensing and resale of LMS services:

- Each wideband LMS provider in a market would be required to resell system capacity to a maximum of two other competitors under conditions that will ensure the integrity of the service.
- At their option, resellers could buy their mobile equipment from the system provider or be licensed to manufacture and use such mobile equipment.

MobileVision submits that those proposed variations to the Interim Rules are fair and workable for all concerned interests. But should the Commission conclude that the record in this proceeding is simply too confused and contradictory to support those proposals, MobileVision strongly urges that the Commission simply continue the Interim Rules, on which the pioneers in LMS have relied in system development and capital investment and to which all parties have been subject for twenty years, with only the minor clarifications as set forth above providing that wideband licensees who are first to build in a licensed market should be protected from interfering systems who subsequently wish to also enter that market on the same frequencies and redefining LMS services as described above. After a period of several years or at such time as the Commission has determined that the marketplace has matured to the point that technical and economic requirements are more

clearly definable,[6] the promulgation of permanent rules can be reconsidered. Until then, the allocation scheme and other conditions contained in the Interim Rules should continue in effect[7] and upon adoption of permanent rules all who have deployed systems in the interim should be grandfathered. The indefinite continuation of this proceeding, however, is crippling the ability of providers such as MobileVision to attract the necessary capital to deploy its already developed systems. It is essential, therefore, that this rulemaking be not simply prolonged but that the Commission decide quickly to adopt the solutions MobileVision has offered or decide to postpone any significant changes to the Interim Rules.[8] Otherwise, the LMS services will die the slow death of day-to-day uncertainty and

---

6 In 1974, it was the intention of the Commission that permanent rules would follow the development of those conditions based on experience. Until recently, market conditions have not created an environment in which this has occurred. Should the Commission choose to defer the adoption of final rules at this time, the market conditions do exist to permit rapid development and deployment sufficient to establish "real life" experience and market data rather than hypothetical assumptions to define those conditions.

7 Including the required separation of wideband and narrowband licensing and the secondary status of Part 15 users to LMS within the spectrum.

8 TIA's suggestion that the Commission delay final rules was coupled with the suggestion that LMS services be removed to new spectrum that might be made available in the future. While MobileVision may, under appropriate circumstances, be willing to relocate at some time if all of the other conditions it has set forth for viable and technically sound LMS service could be addressed in final rules governing a new spectrum allocation, neither MobileVision or any other LMS providers should be required to wait for that allocation to provide service to the public.

the public needs for such systems will continue to go unmet.

DISCUSSION

I. THE FURTHER COMMENTS OF THE OTHER LMS PROVIDERS ARE FOR THE MOST PART INCONSISTENT AND DO NOT ESTABLISH A RECORD ON WHICH SIGNIFICANT DEVIATION FROM THE INTERIM RULES CAN BE GROUNDED.

The Further Comments submitted by Teletrac, Southwestern Bell, Pinpoint and AMTECH do not offer any significantly new viewpoints on the critical issues in this proceeding. All share one theme: they are in strong disagreement with at least one of the positions taken by every other LMS commenter. MobileVision has provided descriptions of the deficiencies of the positions taken by the other LMS providers in its prior submissions, including its Further Comments, with voluminous technical support in its annexes to that submission. Here, it suffices to simply summarize those continuing deficiencies, particularly as reflected in the Further Comments of the other prospective or actual LMS entities.

A. TELETRAC

The most significant source of confusion in the record of this proceeding is the complete reversal Teletrac has taken with respect to the need for co-channel exclusivity.[9] Notwithstanding all of the technical support and analysis Teletrac has brought to this proceeding indicating that wideband LMS systems cannot technically share the same frequency band in the same geographic area, Teletrac now proposes a frequency plan that

---

9 To further complicate matters, Teletrac now claims that it still "far prefers" the original allocation proposal of 2-8-6-8-2 MHz made by the Commission in its NPRM. According to Teletrac, its ex parte submission was only a compromise. Further Comments of Teletrac at pp. 1-2.

requires the overlay of two wideband LMS systems within the 902-912 MHz sub-band.[10] Now, by its own submission, Teletrac concedes that its ex parte proposal results in limited system capacity and reduced location accuracy and capabilities -- a conclusion that Southwestern Bell and MobileVision support.[11]

For all these reasons as well as those set forth in MobileVision's Further Comments, Teletrac's ex parte proposal is not technically feasible,[12] and it is anti-competitive.[13] Nor has Teletrac's own set of Further Comments provided further support for its extraordinary proposal absent from its ex parte submission. Rather its description of two systems directly overlaying one another during the process of location monitoring -- a proposal that would literally leave to chance the location identification of subscribers in need of assistance for medical emergencies or roadside repair -- best exemplifies the "tragedy of the commons" that Teletrac has urged the Commission to avoid in its prior submissions.

Not surprisingly, AMTECH, which has consistently been opposed to all prior Teletrac positions in this proceeding, now supports Teletrac's ex parte proposal, with only minor

---

10 Contrary to Southwestern Bell's interpretation of Teletrac's ex parte submission, Teletrac has not proposed a time-sharing scheme, nor has Teletrac indicated that such a scheme is technically feasible. Further Comments of Teletrac at pp. 5-6. Teletrac, MobileVision and Southwestern Bell, including the study submitted for it by Virginia Tech, continue to believe that time-sharing is not feasible and is spectrally inefficient. *Id.* See also Further Comments of MobileVision at p. 24; Further Comments of Southwestern Bell at pp. 17-18, as well as the study presented by Virginia Tech at p. 6.

11 With respect to placement of the narrowband forward links, Teletrac has essentially no support. See Further Comments of MFS/TI at pp. 2-4; Further Comments of AMTECH at p. 10; Further Comments of Pinpoint at p. 3; and Further Comments of MobileVision at p. 3.

12 Further Comments of Southwestern Bell at pp. 17-19 and Further Comments of MobileVision at p. 21.

13 Further Comments of Southwestern Bell at pp. 14-17 and Further Comments of MobileVision at pp. 22-23.

changes.[14] By sacrificing the needs of all other wideband systems that are ready to deploy and tailoring a solution that neatly fits only its system parameters, Teletrac has co-opted the support of those with whom it has had violent disagreement in the past.[15] Obviously, the final rules in this proceeding should rest on sounder logic than reduction to the lowest common denominator.

B. SOUTHWESTERN BELL

While MobileVision agrees with many aspects of Southwestern Bell's positions in connection with exclusive use and control of the licensed frequency, it is opposed to the spectrum fragmentation urged by Southwestern Bell that would result in diminished efficiency and reduced capacity.

According to AMTECH, Southwestern Bell's proposal to partition the LMS band into four 4 MHz sub-bands (906-910, 910-914, 916-920, 920-924 MHz) is the most "deleterious" proposal offered in this proceeding because it only allows 9 MHz total bandwidth in which narrowband LMS may operate and a maximum contiguous band of 3.5 MHz for a CalTrans-type of system.[16] MobileVision's proposal, on the other hand, addresses AMTECH's concerns in this regard by providing for a 10 MHz contiguous sub-band for narrowband systems.

---

14 AMTECH's proposed changes are: (1) requiring local-area (narrowband) LMS systems to attenuate their signals in the 909-912 MHz band and (2) moving the narrowband forward links either out of the 902-928 MHz band entirely or to 927.5-928 MHz.

15 One can only speculate as to the motivation of Teletrac in adopting its recent complete reversal of position. Metricom states that it believes Teletrac's "business has failed." Further Comments of Metricom at p. 5. While Metricom and MobileVision ascribe different reasons to Teletrac's lack of success in the marketplace, both agree that Teletrac is seeking to salvage its business by adoption of rules as a cure for its system weaknesses.

16 Further Comments of AMTECH at p. 11.

Pinpoint takes exception to Southwestern Bell's claim that bandwidth has a linear relationship with respect to throughput (or capacity). Pinpoint claims that such a relationship is supra-linear.[17] MobileVision agrees that Southwestern Bell does not accurately set forth the relationship of bandwidth to capacity.[18] Southwestern Bell's proposal to fragment the spectrum would be devastating to the capacity needs of non-celluar LMS providers who seek to meet IVHS goals and market needs, and whose systems are not merely considered adjunct to cellular operations.[19]

C. PINPOINT

While Pinpoint continues to support use of the entire LMS band by all types of operators, Pinpoint finds Teletrac's proposal that wideband LMS operators share a 10 MHz band acceptable.[20] It does so based on the premise that Pinpoint would occupy the 912-928 MHz band on a co-primary basis with local area systems.[21] Pinpoint has also proposed shared voice and forward link bands and has further proposed that the 250 KHz voice band be a trunked radio scheme. This fragmentation of the band and the

---

17 Further Comments of Pinpoint at p. 8.

18 See Further Comments of MobileVision at p. 25 and at Annex 4. See also Annex 2 hereto.

19 Comments of Southwestern Bell (filed June 29, 1993) at pp. 2, 4 ("SBMS believes that LMS will be a natural adjunct to cellular service"). While fragmentation of the spectrum into four 4 MHz bands is inimicable to the efficiency of location services and would raise significant risks that insufficient capacity would exist to allow for viable LMS systems (absent a cellular affiliation), if such systems (or other allocations less than 8 MHz but greater than 4 MHz) were exclusively licensed and solely within the control of the provider, and there were no restrictions on ancillary voice and data services within such systems, then they would constitute a "lesser evil" than the totally unworkable and ill-conceived time-sharing and direct overlay proposals advanced by Pinpoint and Teletrac.

20 Further Comments of Pinpoint at p. 11.

21 *Id.*, p. 26.

corresponding proliferation of specifications that would be required should be compared to the MobileVision proposal for straightforward 8 MHz LMS bands that include integral forward link and information channels.

Pinpoint offers little new to its basic and solitary scheme that time-sharing can work in the LMS environment. The results of Pinpoint's "test" in Washington, D.C., when analyzed, show that it will be the most devastating system to Part 15. Its proposed scheme is also simply the most destructive approach to LMS service and would preclude their deployment to serve the public's needs. Southwestern Bell, Teletrac and MobileVision remain consistently opposed to Pinpoint's position, and the Virginia Tech report submitted by Southwestern Bell demonstrates that it is unworkable.[22]

D. AMTECH

AMTECH supports full sharing of the LMS band by all types of operators with the exception of quiet zones at 906-910 MHz and 920-924 MHz in which narrowband LMS operators would be required to attenuate their signals so that interference to wideband LMS could be reduced.[23] Since the beginning of this proceeding, Southwestern Bell, Teletrac and MobileVision have held that narrowband LMS systems cannot coexist on the same frequencies as wideband LMS systems.[24] None of these parties has indicated a change in that thinking, and the Commission's proposals as found in the NPRM are consistent with this separation.

******

22 Further Comments of MobileVision at p. 24; Further Comments of Teletrac at pp. 5-6; and Further Comments of Southwestern Bell at pp. 17-18.

23 Further Comments of AMTECH at p. 3.

24 MobileVision submitted a detailed analysis in support of this position as Annex 3 to its Reply Comments, filed on July 29, 1993.

It is clear that each of the positions espoused in the Further Comments discussed above centers on the advocacy of systems that neatly fit either the system limitations of the commenter or their extraneous resources as cellular affiliates. But that advocacy is not founded on scientific analysis. The needs of the marketplace and national goals of IVHS will not be served if rules are narrowly drawn to meet such individual situations. Rather, those rules should be soundly based on broad capabilities that should be provided without interference and with capacity to adequately serve the public.

II. ANCILLARY VOICE CAPABILITY IS ESSENTIAL FOR BOTH THE ECONOMIC VIABILITY OF NON-CELLULAR LMS PROVIDERS AND TO MEET THE NATIONAL GOALS OF IVHS.

In MobileVision's Further Comments, it described in detail the necessity for ancillary voice and data capability to meet the needs of IVHS goals and to serve market demands.[25] If LMS providers are denied the capability and the necessary capacity to offer such services, they will neither serve the public interest nor establish the economic viability to attract capital sufficient to ensure their deployment. Teletrac's failure to achieve market success is due to its very limited ancillary services.

At one time or another in this proceeding, Pinpoint, Southwestern Bell and Teletrac have all recognized that voice and data services ancillary to location services benefit the public and are logical adjuncts to location services.[26]

---

25 Further Comments of MobileVision at pp. 13-19.

26 Further Comments of Pinpoint at p. 23; Further Comments of Teletrac at pp. 8-9 and Teletrac's ex parte submission dated January 26, 1994; and Comments of Southwestern Bell filed June 29, 1993 at pp. 2, 4.

As reflected by all of the wideband LMS commenters and contrary to the statements of Mark IV IVHS Division, ancillary voice services are of sufficient importance and relevance to be centrally within the focus of this proceeding. Cf. Further Comments of Mark IV IVHS Division at pp. 9-10.

While clearly envisioning voice and data services as an adjunct to its LMS system, Southwestern Bell now argues that voice services are not within the Commission's original perception of LMS, and thus, voice services should be left to cellular providers. MobileVision submits that voice services are of such a significant importance to LMS that the Commission cannot hold LMS captive to the duopoly markets of the cellular industry.

AMTECH, after advocating a frequency plan based on the premise that all of the various users within the 902-928 MHz band can coexist without interference, states a concern that ancillary voice services will "imperil the already delicate balance among the various services sharing the band."[27] MobileVision's proposed modest revisions to the Interim Rules, however, allocating 10 MHz of contiguous band should provide more than adequate bandwidth for narrowband LMS needs as described in AMTECH's prior filings.

Furthermore, Pinpoint and AMTECH have suggested that the integration of LMS location functions with other services, i.e., cellular communications services, is the appropriate means to ensure the necessary ancillary services.[28] However, integrated products are simply not cost effective from the service providers' and the consumers' points of view and will not allow the introduction of such services to a broad market.[29] An LMS system can provide all three related functions (location, voice and data) in one unit and on a stand alone system basis, thus, negating the need to integrate additional units

---

27 Further Comments of AMTECH at p. 2. In addition, AMTECH states that MobileVision's concern about voice services is a guise to obtain 8 MHz of bandwidth. As affirmed by Pinpoint (Further Comments at p. 23) and AMTECH (Further Comments at p. 2), the Interim Rules permit ancillary voice services, and were premised on two 8 MHz band allocations. MobileVision, based on market research, has designed its system accordingly, and the issue of voice services was not relevant until the proposal to reduce the bandwidth to 4 MHz was suggested.

28 Further Comments of Pinpoint at pp. 23-24; Further Comments of AMTECH at p. iii. See also Further Comments of Mark IV IVHS Division at pp. 8-9.

29 See Further Comments of MobileVision, Annex 1, pp. 15-18.

and systems at an increased cost. MobileVision is not saying, as Pinpoint seems to have read it to say, that integrating cellular with GPS should be avoided.[30] In fact, MobileVision believes that consumers should have the option to choose between cellular/GPS, LMS and any other competitive location services. When voice is the primary requirement, wideband systems such as MobileVision's cannot compete with cellular on a per call cost (nor do they have the capacity to so compete). However, LMS clearly would offer a low cost option to consumers for their location needs, and such an option should not be precluded by denying ancillary voice and data capabilities and, thus, placing LMS at a distinct disadvantage to the other competitive location service offerings nor should the rules deprive the public of that competition. The Commission should continue its long-standing policy to insure the availability of the broadest services and choices to the broadest market. MobileVision has such broad services available and its market studies, both qualitative and quantitative, show the public wants these services.

******

In order to provide these services, LMS systems must have the capacity of 8 MHz contiguous bandwidth on an uninterrupted basis. MobileVision's prior submissions, including its recent Further Comments, have discussed these needs in detail. The paper submitted by TIA[31] suggested that, past a certain point, allocating 8 MHz to a single system is less efficient than operating two systems on separate 4 MHz bands. This conclusion is incorrectly drawn. TIA's analysis was based on a model in which no

---

30 Further Comments of Pinpoint at p. 24. Indeed, MobileVision holds patents for GPS/ cellular combinations. MobileVision, however, chose to design its LMS technologies in order to serve the urban settings and other environments where GPS is inadequate.

31 "Analysis of Teletrac Receiver Performance and Part 15 Interference." Exhibit A to Comments of TIA MPC and Personal Communications Radio Section, March 15, 1994.

information is transmitted on the location burst. In direct sequence spread spectrum location systems, the length of a code sequence is known as an "epoch." The duration of the transmitted location pulse usually consists of several epochs, which can be considered as "information bits" (even if no information is actually sent). The TIA paper considered only the accuracy of a single epoch and not the total duration of a location pulse, which averages the timing errors of a number of epochs. In fact, doubling the bandwidth increases the location capacity fourfold; provided that the received signal is above the threshold. The relationship between bandwidth and capacity (both location and information) is discussed in Annex 1 hereto. Discussions between MobileVision engineers and Dr. Padgett, the author of the TIA paper, have taken place and he is in agreement with the comments contained in Annex 1 hereto. A full technical analysis is given in Annex 2 hereto, "Basic Relationships Concerning Location Using Direct Sequence Spread Spectrum." The relationship between bandwidth, location and information capacity is complex, but a 4 MHz band can result in on-fourth of the location capacity and half of the information capacity of an 8 MHz band.

Similarly, MobileVision's Further Comments (including Annex 4 thereof) have already addressed the inefficiencies and lack of capacity that will result if two side-by-side 4 MHz bands were established for LMS systems. Of course, the feasibility for Southwestern Bell to operate on such a system must be understood in conjunction with its affiliation with a cellular provider and its intentions to provide LMS as an adjunct to cellular services.

III. THE CONCERNS OF PART 15 USERS ARE ADDRESSED ADEQUATELY IN THE MOBILEVISION PROPOSALS AND SHOULD NOT, IN ANY CASE, DOMINATE THE DIRECTION OF THIS RULEMAKING.

The proliferation of Part 15 devices within the spectrum allocated for LMS services, both wideband and narrowband, is undeniable. These devices, however, vary significantly

in power usage and operating conditions: many are used in applications that will neither cause nor be affected by interference in relation to the operation of LMS systems; others will undoubtedly not be able to coexist on the same frequencies with such systems. All Part 15 applications within the 902-928 MHz spectrum share one common attribute -- their secondary status to LMS systems in the band.

This is not to say that the concerns of their representatives should go unrecognized. MobileVision has proposed several revisions to the present Interim Rules and the proposals contained in the NPRM that reflect those concerns. While maintaining the presence of Part 15 users throughout the spectrum, these proposals would establish 10 MHz of bandwidth that will act as a safe haven for Part 15 users from the interference of wideband systems, establish tolerance levels to permit Part 15 use throughout the balance of the spectrum where wideband systems will exist and the use of Part 15 will remain secondary,[32] and require that wideband LMS providers who find that currently existing Part 15 installations above that tolerance level interfere with their licensed use defray the reasonable costs of moving such Part 15 users.

Counter to these proposals to establish the maximum usage of the spectrum and to recognize that, where possible, a balancing of competing interests in the spectrum is appropriate, are the radical positions of certain representatives of the Part 15 community who present the issues for the Commission in overly-simplistic terms: them or us. The radical proponents of this cause would ignore completely the existence of the current long-standing regulatory framework. Indeed, certain of these proponents now employ the

---

32 Annex 2 of MobileVision's Further Comments sets forth initial calculations of an Interference Analysis of Part 15 Devices and wideband LMS systems. Unfortunately, as of the date of these Further Reply Comments, other wideband LMS system providers have provided no further input as to the appropriateness of the tolerance level for Part 15 uses.

legerdemain expressed in the earlier AMTECH comments to the effect that the NPRM proposes a reduction in their current spectrum "rights." While MobileVision believes that the competing interests should be balanced equitably, the starting point for that balance is the current state of allocation and priority.

LMS offers valuable services that will (1) form an integral component of IVHS, (2) contribute to the nation's productivity in its commercial applications, and (3) address the safety and security concerns of the nation's consumers. The NPRM has already recognized that this is so.[33] Under MobileVision's constructive proposals, these services will be provided without significant dislocation of Part 15 users. But if, even after application of those provisions, some Part 15 devices must be relocated to the hundreds of megahertz of spectrum that has already been provided for use of Part 15 devices outside of the LMS allocated spectrum, no injustice has occurred.[34] These were the ground rules on which the introduction of Part 15 was based. Their proponents should not be permitted to simply turn the world upside down because those established rules may require adjustment to their frequency use. Rather, the Commission should consider and adopt the proposals of MobileVision that seek a balance of the competing needs of all users in the 902-928 MHz spectrum.

---

33 Part 15 commenters, such as Metricom, in essence argue that their services are simply more important than LMS -- a position they might well advance against any competing service in these bands but which is conceptually inconsistent with an allocation scheme in which Part 15 is secondary and unlicensed.

34 For spread spectrum Part 15 devices, authorized up to 1 Watt of power, there is some 200 MHz of spectrum outside the LMS band available for use.

CONCLUSIONS

The Interim Rules have governed the development, investment and deployment of LMS services for twenty years and significant deviations to those rules should be predicated on a clear record and justification. That record does not, in most respects, appear in this proceeding, and the comments of most of the parties hereto have an inadequate basis in technical analysis or market experience. MobileVision, after review of the comments and submissions of all interested parties in this proceeding, has provided the Commission in its Further Comments with proposals that address the needs of all the parties. It has done so while maintaining its steadfast conviction that the needs for economically viable and technically sound systems, including ancillary voice and data, must be addressed in final rules promulgated for the 902-928 MHz LMS spectrum. The Commission should not adopt rules that do otherwise.

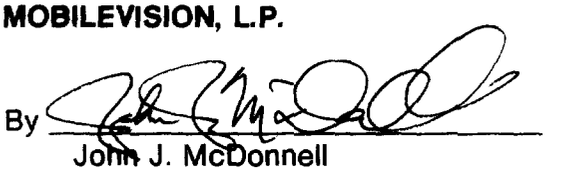
In the event that the Commission finds the record too contradictory to form a basis for final rules that include MobileVision's proposals, it should continue the Interim Rules, with the minor changes suggested by MobileVision, and allow the marketplace to further define its needs.

While MobileVision believes firmly that the time has come to issue sound final rules,

it would prefer no new rules rather than rules inappropriately adopted without the proper technical and economic basis.

Respectfully submitted,

MOBILEVISION, L.P.

By 

John J. McDonnell
Marnie K. Sarver
Matthew J. Harthun

REED SMITH SHAW & McCLAY
1200 18th Street, N.W.
Washington, D.C. 20036

Its Attorneys

March 29, 1994

Technical Note
Discussion of Bandwidth and Capacity Relationships

The paper submitted by the TIA[1] suggested that past a certain point, doubling the bandwidth (e.g. from 4 MHz to 8 MHz) , is less efficient than operating on two separate 4 MHz bands. Discussions with Dr. Padgett, the author of the TIA paper, have taken place[2] and he is in agreement with the following comments.

TIA's analysis was based on a model in which no information is transmitted on the location burst[3]. In direct sequence spread spectrum location systems, the length of a code squence is known as an "epoch". The duration of the transmitted location pulse usually consists of several epochs, which can be considered as "information bits" (even if no information is actually sent). In this case, the analysis by TIA must be extended (i.e. TIA's parameter "n", which represents the number of information bits transmitted, will be greater than 1).

As shown in the accompanying Technical Note[4], the direct effect of doubling the bandwidth is:

1) the number of locations per second is increased by a factor of four (because the duration of the location burst can be reduced by four, for the same accuracy).
2) the relative range of the mobiles is reduced to 0.82.
3) the information capacity, per location burst, is halved,

but 4) the total information capacity is doubled[5].

It is also shown in the accompanying Technical Note, that if both the code length and the bandwidth are doubled, then:

1) the location capacity is increased fourfold,
2) the range is the same
3) the information capacity, per location burst, is reduced by four,

but 4) the total information capacity is the same.

From this it can be seen that the two requirements of location capacity and data capacity are somewhat in opposition. If the bandwidth is increased, by the use of a faster chipping rate, it is better to also increase the code length so as to maintain the range. This results, however, in no gain to the information capacity of the location burst. If the location burst is used for data transmissions then it is desirable to keep the code length, L, constant, but, as the chipping rate is increased (in order to increase the location capacity), the range reduces.

---

[1]"Analysis of Teletrac Receiver Performance and Part 15 Interference", Exhibit A to Comments of TIA MPC and Personal Communications Radio Section, March 15, 1994.
[2]Dr. Padgett was also sent a copy of the Technical Note, "Basic Relationships concerning Location using Direct Sequence Spread Spectrum".
[3]Dr. Padgett based the analysis on information from Teletrac which indicated that no information is transmitted on the reverse link locating burst.
[4]Technical Note, "Basic Relationships concerning Location using Direct Sequence Spread Spectrum".
[5]There are four times as many location bursts, each burst having half the data.